

# Sleep Deprivation in Junior Doctors —House Officers in Singapore

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**Abstract:** House officers are known to endure marked levels of sleep deprivation in administration of their duties. We aim to establish sleep patterns of local house officers while on the job and the impact it might have on their mood and sleepiness state. We also studied their sleep during their final year of medical school and pre-university for identification of any prior sleep deprivation. Questionnaires were used to assess sleep and mood change. Sleepiness levels on the day after call were assessed using the Stamford Sleepiness Scale. Subjects were found to sleep a median of only 1.0 ( $\pm$  2.0) h per night on call and 6.0 h ( $\pm$  1.0) per non-call night. They suffered median of 5 interruptions ( $\pm$  5) during sleep on one night call. Night call was found to adversely affect mood in 89.5% of the subjects while daytime sleepiness levels following call were found to increase the more the time spent at work after call. Subjects were found to have had 6.5 h ( $\pm$  1.0) of sleep per night during final year of medical school and 8.0 h ( $\pm$  1.0) in final year of pre-university. House officers enter the profession chronically sleep-deprived. The call schedule and general work regime further add to the existent sleep deprivation and may have adverse consequences on patient care and doctor's health. This calls for measures to be instituted for provision of proper sleep and work hours for them.

**Key words:** House officers, Singapore, Sleep deprivation, Mood

## Introduction

House officers have been known to work long hours with little sleep, especially during night calls, when average sleep durations of as low as 2.8 h<sup>1)</sup> and 3.7 h<sup>2)</sup> have been reported. This is a matter of grave concern to the health care industry where the physicians are required to function under condition of chronic sleep deprivation. Sleep deprivation can affect clinical performance and patient safety because of medical errors<sup>3, 4)</sup>. Medicine is an industry where public safety is at risk, but does not have mandatory restriction on working hours.

This study aims to establish the sleep patterns of house officers in Singapore. These patterns have not previously

been documented. Subjective assessments of their sleepiness levels and their mood were also made on the day after a night on call. In addition, house officers were asked to recall their sleep habits prior to housemanship, in order to detect possible chronic sleep deprivation.

## Materials and Methods

### *Study population and exclusion criteria*

Our study population comprised randomly selected house officers, with work experience ranging from 1 to 8 months, working across general hospitals in Singapore. The subjects were studied during May to June 2002. Subjects with doctor-diagnosed sleep disorders or on medications that could influence sleep patterns were excluded.

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### Assessment method

The study comprised two parts. The first part of the study entailed administration of questionnaires that assessed the subjects' sleep patterns during their final year of medical school and during their final pre-university year. Sixty house officers participated in this aspect of the study (age 24–26 yr, 41 men and 19 women).

The second part of the study was also questionnaire-based. This aspect of the study assessed the total amount of sleep obtained by the subjects on average, both over previous nights on call, and over nights when not on call. House officers were also asked to state the perceived average number of interruptions out of sleep they had been subjected to during previous nights on call over the past 1 month of work. In addition, house officers were also assessed immediately after a night on call to more accurately document sleep patterns and reduce recall bias. Their sleep hours, sleepiness levels and mood were documented. The subjects' mood change was subjectively assessed by letting subjects select from a list, moods that best described the effect night call had on them. The list included "tired", "ill-tempered", "depressed", "disoriented", "anxious" and "no change". Provision was made for the subjects to describe their mood change better with another word, if the listed moods did not best reflect their state. Daytime sleepiness levels of house officers were subjectively assessed using the Stanford Sleepiness Scale (SSS)<sup>5</sup>—a Likart scale from 1 to 7, 7 being the state indicative of greatest sleep propensity. SSS is an established tool in assessment of acute changes in sleepiness level<sup>6</sup>. Paper slips containing the SSS scales were handed out to the participating house officers. These were to be filled out by them on an hourly basis from 0700 h on the post-call day till the time of the scheduled appointment when the doctors were interviewed for the study. This could be anytime from 1000 h–1600 h. Thirty eight house officers participated in this aspect of the study.

### Statistics

Data was processed using statistical package SPSS 11.0. Medians are presented with the inter-quartile range written within brackets. The Wilcoxon sign rank test was used to compare medians. A two-tailed *p*-value of less than 0.05 was considered significant.

## Results

### *Sleep patterns during Pre-University and Final Year of Medical School (Table 1)*

Subjects slept a median of 8.0 h ( $\pm$  1.0) per day in pre

**Table 1. Durations of sleep obtained since pre-university**

Period	Median Sleep Obtained Per Day (hours)
Pre-University	8.0 ( $\pm$ 1.0)
Final year medical school	6.5 ( $\pm$ 1.0)
Housemanship	
<i>Non-call nights</i>	6.0 ( $\pm$ 1.0)
<i>Nights of call (previous)</i>	1.0 ( $\pm$ 2.0)
<i>Total sleep during night of call</i>	2.0 ( $\pm$ 1.6)
<i>Longest duration of uninterrupted sleep</i>	1.0 ( $\pm$ 1.5)

university, and 6.5 h ( $\pm$  1.0) per day in their final year of medical school. These two distributions of duration of sleep were found to be statistically different ( $p=0.00$ ). Fifty percent of house officers felt that they had not been sleeping enough in their final medical year.

### *Sleep habits of new housemen (Table 1)*

Since beginning work, the house officers reported that they were sleeping 1.0 h ( $\pm$  2.0) on previous nights of call and 6.0 h ( $\pm$  1.0) on non-call nights. The difference between the sleep obtained on call nights and non-call nights was significant ( $p=0.00$ ). Fourteen (36.8%) of the 38 housemen reported not having had any sleep at all on previous calls. Twenty seven (71.1%) of the 38 housemen felt they were not getting enough sleep since they became housemen.

### *Assessment on the night of call*

Thirty four of the 38 h officers managed to get sleep during the night on call, while 4 had no sleep at all. For those who managed to sleep, the total and uninterrupted sleep time measured only 2.0 h ( $\pm$  1.6) and 1.0 h ( $\pm$  1.5), respectively. The housemen who slept were interrupted out of sleep with a median of 5.0 ( $\pm$  5.0) times.

### *Night duty and mood*

Thirty four of the 38 house officers studied found night duty to adversely affect their mood. Of the 34 participants, all felt more tired, 24 felt more ill tempered, 13 felt more depressed and 14 disoriented, while 9 reported night duty to have made them more anxious.

### *Daytime sleepiness levels following night on call*

An upward trend in sleepiness levels was identified amongst housemen following a night on call ( $p=0.001$ , Fig. 1).

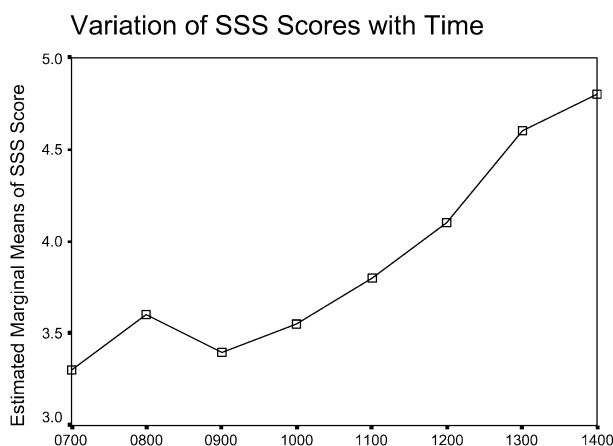


Fig. 1. Daytime sleepiness level of housemen following night on call.

## Discussion

### *Sleep patterns before housemanship*

This study revealed that housemen could already be victims of chronic sleep deprivation prior to entering their profession. The subjects were found to have slept only a median of 6.5 h a day during their final year in medicine as compared to a median of 8.0 h during pre-university. While some experts claim that at least 6 h of sleep is required<sup>7)</sup> for the optimal day-to-day functioning, a recent review article reported that the average underlying sleep tendency in young adults is about 8.5 h per night<sup>1)</sup>. The latter finding implies that pre-university sleep durations of even 8.0 h a night are insufficient.

### *Sleep patterns during housemanship*

This study revealed that when housemen managed to get some sleep during a night on call, they had a total of only 2 h of sleep. Housemen were disrupted from this small amount of sleep on average of 5 times. An average call schedule for a Singapore house officer working in a general hospital is about 6 times a month. These findings coupled with the fact that the housemen sleep only a median of 6.0 h even off duty could well contribute cumulative sleep deprivation that adversely affects doctor performance.

House officers in our study appear to have chronic sleep deprivation that begins before housemanship. Chronically sleep deprived house officers have, in previous studies, been found to have fatigue, decreased vigilance, work productivity and deleterious health side effects<sup>8)</sup>. This is worrying since both doctor's health and patient care is compromised. For instance, in a survey of 254 medical residents, 41% of respondents cited fatigue as a cause of their most significant medical mistakes<sup>9)</sup>.

## Conclusion

There is a necessity for the local governing health bodies to review the current work practice and schedule of junior doctors in training, in particular, the house officers. This is important both for optimal patient care as house officers are the first line in provision of patient care and for healthy working lifestyle for the doctors' themselves<sup>10)</sup>.

The rising trend of post-call SSS scores (indicating increased sleepiness levels) as the post-call day wore on suggests that restricting the number of post-call hours might be an effective strategy.

A way to minimize the sleep deprivation suffered by the house officers is to institute regulations to provide house officers with protected time for sleep. There are, however, drawbacks to this measure. Results from one study has shown that "covered" house officers actually sleep even less because they used protected time to catch up on work, not sleep<sup>11)</sup>.

Acute sleep deprivation could also be reduced by the adoption of a shift rotation schedule for house officers similar to that employed in accident and emergency medicine throughout many hospitals in Singapore.

A suggestion based on a study<sup>12)</sup> would be the possibility of expanding the healthcare professionals to include "night nurses" (NN)—nurses who would work on night shifts along with the house officers on call. They would receive all pages (except extreme emergencies) freeing the residents to complete work-ups, patient assessments, or study. The NN would be the first line in assessment of patients and initiation of healthcare plans, including orders that followed either care protocols or plans previously arranged with the house officer. For unanticipated concerns, the houseman should be notified for input and patient assessment. This method was found to significantly reduce the burden on the overworked house officers and did not contribute to any decrement of delivery of health care.

Given that there is a possible problem of chronic sleep deprivation that stems from the pre-university years and gradually worsened upon entry into medical school, more measure could be taken to educate the public from young, of the importance and benefits of having good sleep hygiene.

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